

# PATENT ABSTRACTS OF JAPAN

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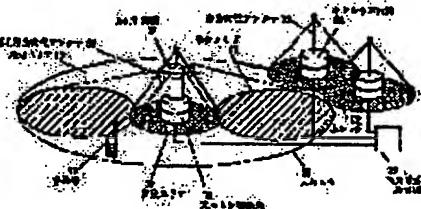
## (54) MOBILE COMMUNICATION BASE STATION EQUIPMENT

### (57)Abstract:

PURPOSE: To install an efficient base station by providing the mobile communication base station equipment with an non-directional antenna, a high gain directional antenna and a controller for controlling the orientation of the high gain directional antenna.

CONSTITUTION: A large cellular base station 08 provided with an non-directional antenna 03, a high gain directional antenna 06 and a direction controller 07 controlling the orientation of the high gain directional antenna is installed in a large cellular 01.

Then the large cellular 01 is provided with a stationary small area (stationary area 09) covered by the non-directional antenna 03 around a base station 04 and a peripheral area 10 surrounding the stationary area 09. The peripheral area 10 is a range of a small area (moving area 11) moved as the orientation of the high gain directional antenna 06 changes. Thus, the number of base stations not increased even in the case of micro cell configuration and the number of the high gain directional antennas provided to each base station is reduced for an area where the number of users is not many.



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CLAIMS

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[Claim(s)]

[Claim 1] Mobile communications base station equipment which is equipped with one or more powerful directive high interest profit antennas and the directional-control machine to which the orientation is changed, detects the direction of a mobile station by these, and secures a communication line with a mobile station in the direction.

[Claim 2] A powerful directive high interest profit antenna and two kinds of antennas of a directive weak nondirectional antenna, And it has the directional-control machine to which the orientation of a powerful directive antenna is changed. Detect the move angular velocity to the direction and base station of a mobile station, and if move angular velocity is large, a radio circuit with a mobile station will be secured using a directive weak antenna. Mobile communications base station equipment which secures a radio circuit with a mobile station in the direction detected using the powerful directive antenna when move angular velocity was small.

[Claim 3] Mobile communications base station equipment which detects a power level on reception instead of detecting the move angular velocity to a base station, will secure a radio circuit with a mobile station using a directive weak antenna if a power level on reception is large, and secures a radio circuit with a mobile station in the direction detected using the powerful directive antenna when the power level on reception was small in a claim 2.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] this invention relates to the mobile communications base station equipment which secures a communication line using radio to the mobile which moves extensively.

#### [0002]

[Description of the Prior Art] This kind of land-mobile object communication device divides the whole service area into two or more service areas (cellular) centering on a base station, and the cellular type mobile communications equipment which manages the mobile station in each cellular one is used for each base station.

[0003] Since it corresponds to the rapid increase in a mobile communications user in recent years, although improvement in frequency use efficiency is called for, there is a miniaturization (microcell-izing) at the flow cellular to one. If the number of mobile stations which can be held in one cellular one is fixed, as the whole service area, the direction which made cellular one small and was divided into much cellular one can hold many mobile stations rather than dividing into big cellular one of a small number of, and can raise frequency use efficiency in field term. Furthermore, if cellular one is miniaturized, since the maximum distance of a mobile station and a base station will become short, the transmission of a mobile station with small power is attained, and it can cut down power consumption, and duration of a call can be expanded, or the mobile station terminal has been miniaturized enough and it can carry out it.

[0004] However, when it miniaturizes cellular one, there is a problem that the number of base stations increases. A open patent official report (common [ 04-256230 ]) is explained to an example for the Prior art for suppressing increase of such a number of base stations.

[0005] Drawing 2 is the example of the mobile communications system base station which applied equipment conventionally. The base station 20 is equipped with an indirectional antenna 21 and the indirectional high interest profit directional antenna 22, and is connected with the public telephone communication network 23. One base station 20 covers cellular (central area 24) one centering on a base station 20 with the indirectional antenna 21, and covers cellular (circumference area 25) one which adjoins central area with the high interest profit directional antenna 22. Thereby, the latus area with which central area and circumference area were aligned can be covered in one base station.

[0006] Since the mobile station 26 belonging to circumference area is separated with the base station 20, although the transmission wave of the mobile station 26 which reaches a base station 20 becomes feeble, since it is received by the high interest profit directional antenna 22, it is received by stability.

[0007]

[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional communication device, when it is going to cover many circumference area in one base station, so many high interest profit directional antennas are needed. Although it becomes efficient base station installation in an area with many users, such as the city section, there is a problem that it is not efficient to assign circumference area each of a high interest profit directional antenna, in an area with few users, such as the farm village section and a mountain slope.

[0008] It was made in order that this invention might cancel the above troubles, and it aims at performing the base station of a cellular mobile communication device efficiently.

[0009]

[Means for Solving the Problem] this invention possesses the control machine which controls the orientation of a nondirectional antenna, a high interest profit directional antenna, and a high interest profit directional antenna to mobile communications base station equipment, in order to attain the above-mentioned purpose.

[0010]

[Function] Therefore, according to this invention, even if it microcell-izes, the number of high interest profit directional antennas with which can suppress the increase in the number of base stations, and a base station is equipped in an area with few users (area of low traffic) can be lessened.

[0011]

[Example] Drawing 1 shows the structure of a system which applied this invention equipment.

[0012] all service areas -- the traffic (use frequency of a communication line) of an every place region -- responding -- the low area of traffic -- a large -- cellular 01 -- the high area of traffic -- small -- cellular division is carried out cellular 02 The small cellular base station 04 equipped with the indirectional antenna 03 is furnished to smallness cellular 02, and the small cellular base station 04 is connected to the public telephone communication network 05. The large cellular base station 08 where it had the directional-control machine 07 which controls the orientation of a nondirectional antenna 03, the high interest profit directional antenna 06, and a high interest profit directional antenna is installed in size cellular 01. Size cellular 01 consists of fixed small area (fixed area 09) which is covered by the nondirectional antenna 03 centering on a base station 04, and circumference area 10 surrounding the surroundings of fixed area. The circumference area 10 is a range which the small area (move area 11) where covers with the high interest profit directional antenna 06, and it moves with change of the orientation of the high interest profit directional antenna 06 moves. The large cellular base station 08 is connected with the public telephone communication network.

[0013] If a mobile station 12 is located in small cellular 02, it will secure a communication line between the small cellular base station 04 which belongs, and if it is located in large cellular 01, it will secure a communication line between the large

cellular base station 08 which belongs.

[0014] The large cellular base station 08 drives a directional-control machine, changes the orientation of the high interest profit directional antenna 06, and investigates the mobile station 12 in large cellular 01. When the mobile station 12 which asks for call origination or a call in is discovered, a directional-control machine makes the orientation of the high interest profit directional antenna 06 follow in footsteps according to fixation of the sense of the mobile station 12, or movement of a mobile station 12. The move angular velocity to the position of a mobile station 12 and a base station 08 is presumed from the control information of the directional-control machine obtained at this time, or the information on a receiving state. If move angular velocity is small, a mobile station 12 will be judged to be what is located in the position (circumference area) distant from the base station 08, and a base station 08 will secure a communication line with a mobile station 12 with the high interest profit directional antenna 06.

[0015] Moreover, even if it does not presume move angular velocity, distance with the base station 08 of a mobile station 12 can be presumed from the size of a power level on reception. If a power level on reception is small, a mobile station 12 will be judged to be what is located in the position (circumference area) distant from the base station 08, and a base station 08 will secure a communication line with a mobile station 12 with the high interest profit directional antenna 06. If a power level on reception is large, a mobile station 12 will be judged to be what is located near the base station 08 (fixed area), and a base station 08 will secure a communication line with a mobile station 12 by the nondirectional antenna 03.

[0016] Thus, since the circuit with the mobile station 12 located in circumference area is secured with the high gain nature directional antenna 06 and the direction of the interference wave which receives is restricted, compared with the case where it receives by the highly efficient nondirectional antenna 03, the level ratio for an interference wave of the wave level of choice is made greatly. Therefore, since the stable reception of it is attained even if the mobile station 12 is separated with the base station 08, and a mobile station 12 does not need to enlarge a transmitting output even if it is located in large cellular 01, it is not contrary to the flow of the formation of miniaturization lightweight of a mobile station 12.

[0017] Moreover, direction imitation of a directional-control machine does not need to be high-speed by securing a communication line to the mobile station 12 of the base station 08 neighborhood by the nondirectional antenna 03. Furthermore, if it thinks of those who are engaged in wood agriculture in the mountain slope farm village section as a user for example, the great portion of their service use will be concentrated on the specific area in cellular one. In such a case, if the communication entrepreneur and the user have made the contract which pinpointed the service use area beforehand, the need that a high interest profit directional antenna carries out imitation control will completely be lost, and the composition of a base station will become easier.

[0018] If continuation duration of a call is restricted or a prolonged continuation telephone call is suppressed by carrying out high accounting of time progressiveness to a continuation telephone call, the congestion of a circuit can be stopped even if it cuts down the number of a high interest profit directional antenna further.

[0019] Thus, since the number of the directional-control machine with which a base station 08 is equipped, and the high interest profit directional antenna 06 can be

decided according to the traffic volume in circumference area, installation of the efficient base station 08 is attained.

[0020]

[Effect of the Invention] As mentioned above, according to this invention, even if it microcell-izes, it is effective in the ability to lessen the number of high interest profit directional antennas with which can suppress the increase in the number of base stations, and a base station is equipped in an area with few users (area of low traffic).

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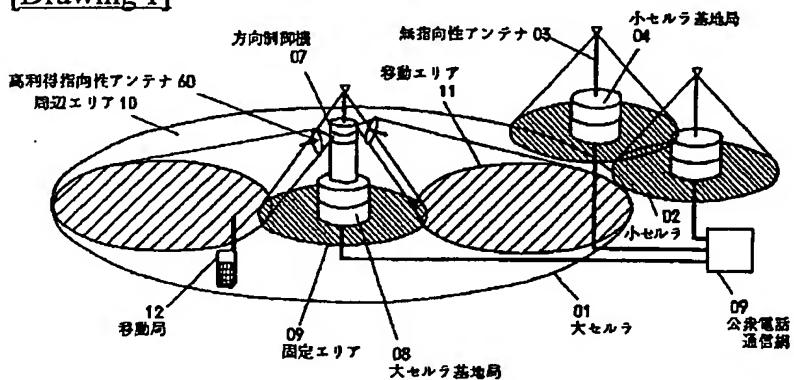
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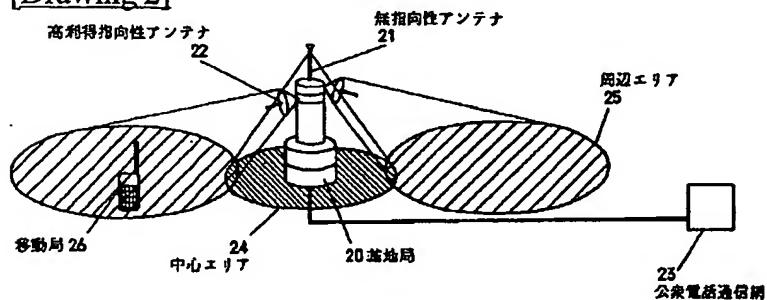
DRAWINGS

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[Drawing 1]



[Drawing 2]



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